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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/852,056	05/10/2001	Hiroyuki Morimatsu	L7016.01113	3770

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EXAMINER	
THOMPSON, JAMES A	
ART UNIT	**PAPER NUMBER**
2624	

DATE MAILED: 12/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/852,056	MORIMATSU, HIROYUKI
	Examiner	**Art Unit**
	James A Thompson	2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 10 May 2001.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-16 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-16 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 10 May 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

2. Examiner notes that Applicant's specification describes in detail prior art methods and systems on pages 1-2 of said specification and in figures 10-11 of Applicant's drawings. Examiner respectfully requests an Information Disclosure Statement listing the references in which said prior art methods and systems are explained, along with copies of the corresponding references cited. Applicant clearly considers said references to be relevant to Applicant's invention.

Specification

3. The abstract of the disclosure is objected to because, on line 4 of the abstract, "image after binarized" should be changed to "image after binarization" since the noun form is clearly intended. Correction is required. See MPEP § 608.01(b).

4. The disclosure is objected to because of the following informalities:

On page 11, line 1, "reference numeral 210" should be changed to "reference number 120" since this is clearly intended.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cooper (US Patent 5,696,602) in view of Hashimoto (US Patent 5,424,854).

Regarding claims 1 and 12: Cooper discloses an image processor (figure 12 of Cooper) comprising an image memory (figure 12(222) of Cooper) for storing multi-valued image data therein (column 15, lines 52-53 of Cooper); and pixel data acquisition means (figure 12(228) of Cooper) for acquiring the image data stored in said image memory on a pixel-by-pixel basis (column 15, lines 16-20 of Cooper). Since digital data is processed sequentially in a serial port (figure 12(218) of Cooper) and thus transferred to said image memory, the data obtained from said image memory and transferred to said pixel data acquisition means must also be processed sequentially. Sequential processing means that the digital data is processed on a pixel-by-pixel basis.

Cooper further discloses dither matrix storage means (figure 12(232) of Cooper) for storing a dither matrix (column 15, lines 54-56 and lines 61-63 of Cooper) arranged irregularly with a non-iterative property (column 13, lines 37-41 of Cooper); and threshold value data acquisition means (figure 12

(214) and column 14, lines 58-65 of Cooper) for acquiring threshold value data corresponding to the image data from the dither matrix storage means (column 10, lines 16-20 of Cooper) on the basis of an address of the image data inputted from said pixel data acquisition means (figure 2B; column 10, lines 21-25; and column 5, lines 33-38 of Cooper). The threshold values are generated at specified addresses within the dither array and are used to create the various gray levels (column 10, lines 16-20 of Cooper). The threshold value is based on the address, the size of the dither array, and the range of gray level values (column 10, lines 21-25 of Cooper). The dither array is tiled and wrapped around the entire image data space (figure 2B and column 5, lines 33-38 of Cooper). The threshold values are therefore based on the addresses of each pixel of the image data. The processor comprises a microprocessor (figure 12(214) of Cooper) which has address lines, data lines, and control lines and performs the various functions of the printer (column 14, lines 58-65 of Cooper). Since said microprocessor accesses the various digital data addresses and the various memories (column 14, lines 58-65 of Cooper), said microprocessor acquires the threshold values and applies them to the addresses of the image data.

Cooper further discloses a comparator (figure 12 (230(Rasterizer)) of Cooper) for comparing the image data of the pixel unit inputted from said pixel data acquisition means with the threshold value data inputted from said threshold value data acquisition means to output a predetermined binary signal (column 15, lines 53-59 of Cooper). In order to halftone a digital image (column 15, lines 53-59 of Cooper), the pixel data stored in the image memory and transferred to the pixel data

acquisition means must be compared with threshold values stored in the threshold value data acquisition means. This is how halftoning is performed, as is well-known in the art.

Cooper does not disclose expressly that said dither matrix has energy focused dots positioned in respective cells.

Hashimoto discloses a dither matrix (figure 4 of Hashimoto) having energy focused dots positioned in respective cells (column 4, lines 41-43 of Hashimoto). By centering the first dither matrix threshold value (figure 4("1") of Hashimoto) and increasing the dither matrix threshold values in a spiral progression (figure 4 and column 4, lines 41-43 of Hashimoto), the dots positioned in their respective cells are energy focused. In other words, the dot locations for each progressive threshold value emanates in a pattern from the center of the dither matrix.

Cooper and Hashimoto are combinable because they are from the same field of endeavor, namely image dithering. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to arrange the dither matrix taught by Cooper in an energy focused manner, as taught by Hashimoto. The motivation for doing so would have been to be able to obtain the same output image, even if resolutions are changed (column 5, lines 11-15 of Hashimoto). Therefore, it would have been obvious to combine Hashimoto with Cooper to obtain the invention as specified in claims 1 and 12.

Regarding claims 2 and 13: Cooper discloses that wherein said dither matrix (figure 4A(9) of Cooper) is divided into a plurality of cells (figure 4A(8) and column 8, lines 53-55 of Cooper), dot growth is made by making dot growth patterns mutually different (column 13, lines 37-41 of Cooper).

Cooper does not disclose expressly that dot growth is made by arranging dots in each cell as concentrated.

Hashimoto discloses that dot growth is made by arranging dots in each cell as concentrated (figure 4 and column 4, lines 41-43 of Hashimoto). A spiral dot growth pattern (figure 4 and column 4, lines 41-43 of Hashimoto) causes a concentrated arrangement of dots in each cell, as shown in figures 6 and 7 of Hashimoto.

Cooper and Hashimoto are combinable because they are from the same field of endeavor, namely image dithering. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to arrange the dots of the dither matrix taught by Cooper in a concentrated pattern, as taught by Hashimoto. The motivation for doing so would have been to be able to obtain the same output image, even if resolutions are changed (column 5, lines 11-15 of Hashimoto). Therefore, it would have been obvious to combine Hashimoto with Cooper to obtain the invention as specified in claims 2 and 13.

Regarding claim 3: Cooper discloses that the dots that are grown are irregularly positioned (column 13, lines 37-41 of Cooper).

Cooper does not disclose expressly that said dots in the cells are grown as concentrated around their energy focused dots.

Hashimoto discloses that said dots in the cells are grown as concentrated around their energy focused dots (figure 4 and column 4, lines 41-43 of Hashimoto) irregularly positioned.

Cooper and Hashimoto are combinable because they are from the same field of endeavor, namely image dithering. At the time of the invention, it would have been obvious to a person of

ordinary skill in the art to arrange the dots of the dither matrix taught by Cooper in a concentrated pattern with energy focused dots, as taught by Hashimoto. The motivation for doing so would have been to be able to obtain the same output image, even if resolutions are changed (column 5, lines 11-15 of Hashimoto). Therefore, it would have been obvious to combine Hashimoto with Cooper to obtain the invention as specified in claim 3.

Regarding claim 4: Cooper discloses that said dots are arranged in each cell so that an inter-dot density becomes most uniform (column 5, lines 45-51 of Cooper).

Regarding claims 5 and 14: Cooper discloses that a density between said dots in each cell is calculated on the basis of distances between energy focused dots positioned in said respective cells (column 6, lines 15-24 of Cooper). Minimizing the variance, and thus the "cost function" of the dot placement, creates an image that is most uniform in density (column 6, lines 15-24 of Cooper). By basing the dot placement on the variance of the dither matrix, a density between said dots in each cell is calculated on the basis of distances between energy focused dots positioned in said respective cells since the variance is based on the distance between the dots positioned in each cell (figure 11 and column 13, lines 42-49 of Cooper).

Regarding claims 6 and 15: Cooper discloses that said dots in each cell are grown in a dot growth pattern so as to be most uniform in density with respect to dots to be generated in the cell adjacent to the cell of interest (column 5, lines 45-51 of Cooper). By minimizing the variance in the MxN regions, the dot growth pattern for the entire MxN set of regions is most uniform in density (column 5, lines 45-51 of Cooper). Therefore, the

dots in each cell are grown in a dot growth pattern that is most uniform with respect to dots to be generated in the cell adjacent to the cell of interest, since said adjacent cell is a part of the MxN set of regions.

Regarding claims 7 and 16: Cooper discloses that said dot density in the cell of interest is calculated on the basis of distances from dots in the cells adjacent to the cell of interest (column 6, lines 15-24 of Cooper). Minimizing the variance, and thus the "cost function" of the dot placement, in a MxN set of regions creates an image that is most uniform in density (column 6, lines 15-24 of Cooper). By basing the dot placement on the variance of the MxN set of regions (figure 11 and column 13, lines 42-49 of Cooper), and thus said adjacent cells, a density between said dots in each cell is calculated on the basis of distances from dots in the cells adjacent to the cell of interest.

Regarding claim 8: Cooper does not disclose expressly that said threshold values are set in said dither matrix so that an average of set values in said each cell is an intermediate value of density levels in said image data.

Hashimoto discloses that dot growth in a cell of the dither matrix is made by arranging dots in a spiral dot growth pattern (figure 4 and column 4, lines 41-47 of Hashimoto), wherein the threshold values are incrementally increased from 1 to the maximum pixel value (figure 4 of Hashimoto). In figure 4 of Hashimoto, the incremental step for an 8x8 cell of the dither matrix is 1. The average of the set of values for the cell is 32.5, which is intermediate value of density levels in said image data. The density values in the image data are from 1 to

64 in this example (figure 4 of Hashimoto). The average of the set of values (32.5) is the intermediate value.

Cooper and Hashimoto are combinable because they are from the same field of endeavor, namely image dithering. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to increase the threshold values of each element of the halftone cells taught by Cooper in an incremental pattern, as taught by Hashimoto. The motivation for doing so would have been that arranging the dots in an incremental, spiral pattern allows one to be able to obtain the same output image, even if resolutions are changed (column 5, lines 11-15 of Hashimoto). Therefore, it would have been obvious to combine Hashimoto with Cooper to obtain the invention as specified in claim 8.

Regarding claim 9: Cooper discloses that said threshold values in said dither matrix are set differently in said different cells of the dither matrix (column 13, lines 37-41 of Cooper).

Regarding claim 10: Cooper said dots are set at any of a plurality of particular positions in said cells of said dither matrix (column 12, lines 7-15 of Cooper). Although the "cost function" governs the overall dot position selection in the dot profile (column 12, lines 7-12 of Cooper), the dot location is randomly selected from the available set of dots (column 12, lines 12-15 of Cooper). Hence, said dots are set at any of a plurality of particular position in said cells of said dither matrix.

Regarding claim 11: Cooper discloses that said growth patterns of said dots in said cells of said dither matrix are made to have an identical shape when a variation in the dot

shape at the time of generating an identical size of dots causes a printing density of an actual printer to be largely changed (column 13, lines 11-20 of Cooper). By minimizing the isolated pixels to be printed, a particular printer which cannot print said isolated pixels well due to the characteristics of said printer (column 13, lines 11-16 of Cooper), which would cause some printing densities to be changed, the shape of said dot growth patterns of said dots in said cells of said dither matrix would be identical (column 13, lines 11-20 of Cooper).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Peter William Mitchel Ilbery, US Patent 6,124,844, 26 September 2000. In this patent, dithering and halftoning are based on distance-dependent potential functions between dots.

Kolpatzik et al., US Patent 5,745,660, 28 April 1998. Stochastic dithering and a variety of threshold arrays are generated in this patent for the purpose of mitigating printing artifacts. Further, the method in this patent is applicable across a variety of printers.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A Thompson whose telephone number is 703-305-6329. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K Moore can be reached on 703-308-7452. The fax phone number for the

organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

James A. Thompson
Examiner
Art Unit 2624

JAT
26 November 2004

THOMAS D
~~TOMMY~~ LEE
PRIMARY EXAMINER